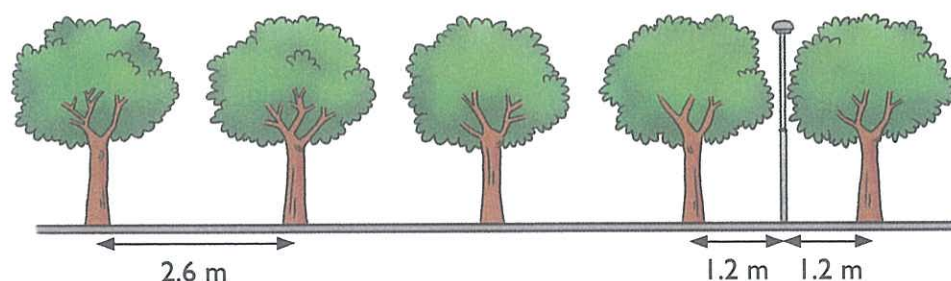


- 27 The table below shows the number of cakes sold by a shop.

Day	Number of cakes
Tuesday	?
Wednesday	316
Thursday	425
Friday	?
Saturday	502

It sold a total of 3412 cakes from Tuesday to Saturday. It sold fewer cakes on Tuesday than on Friday. The difference in the number of cakes sold on Tuesday and Friday was the least possible value. How many cakes were sold on Friday?

- * 28 A crate of oranges was shared equally among 15 people. 5 people gave up $\frac{3}{5}$ of their share. As a result, the remaining people received 12 more oranges each. How many oranges were there in the crate at first?
- * 29 Zac and Sally share some stickers. If Zac gives Sally $\frac{1}{2}$ of his stickers, Sally will have 48 more stickers than Zac. If Zac gives $\frac{1}{4}$ of his share to Sally, Sally will have 28 more stickers. How many stickers does Zac have at first?
- * 30 The figure below shows the arrangement of lamp posts and trees along a stretch of road. A lamp post is placed after every 4 trees. The distance between the lamp post and a tree is 1.2 m. There are 45 trees along the road. What is the length of the road?



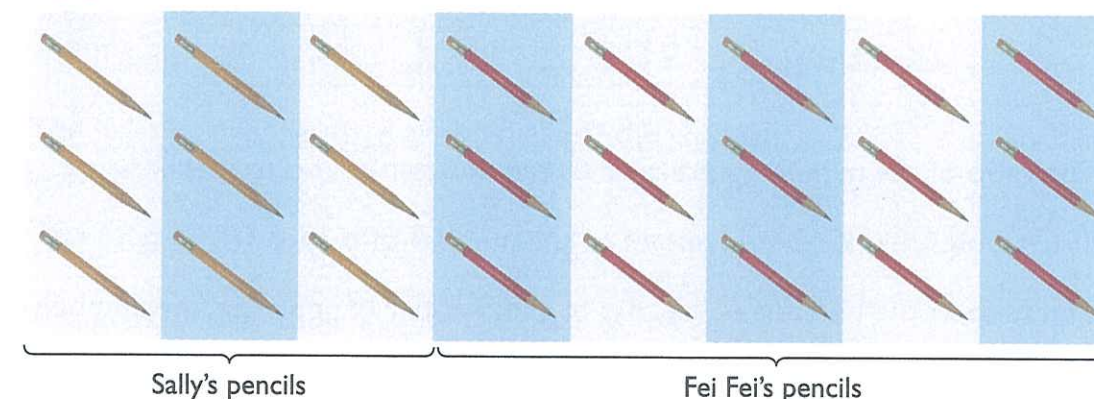
5 Ratio

Let's Learn!

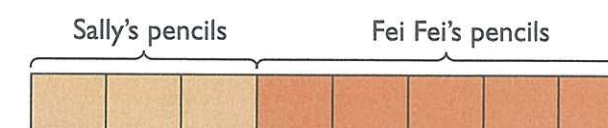


Ratio And Fraction

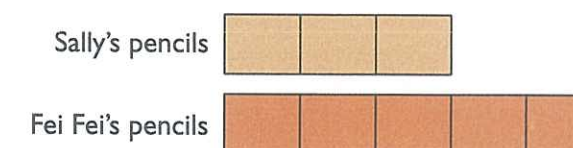
- 1 Sally has 9 pencils. Fei Fei has 15 pencils.



We can show the number of pencils both girls have by using a model.



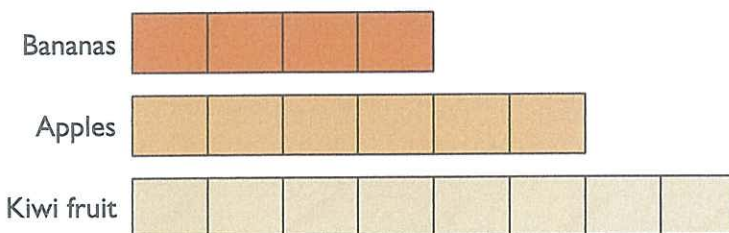
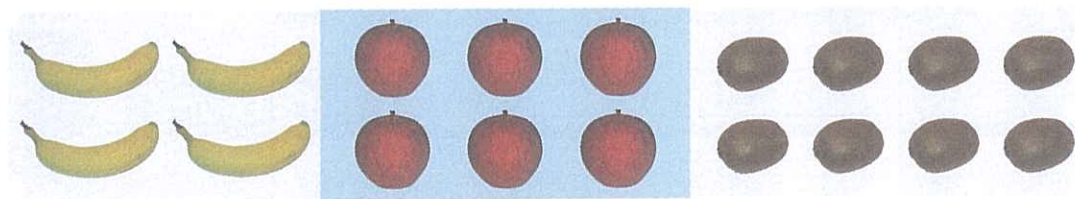
We can also arrange the model in another way.



The ratio of the number of Sally's pencils to the number of Fei Fei's pencils is 3 : 5.

The ratio of the number of Fei Fei's pencils to the number of Sally's pencils is 5 : 3.

- 2 There are 4 bananas, 6 apples and 8 kiwi fruit in a basket.



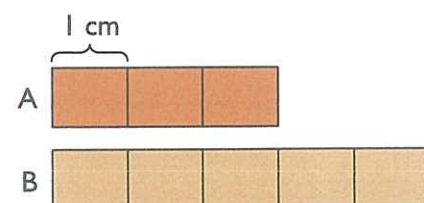
The ratio of the number of bananas to the number of kiwi fruit is $4 : 8$.

The ratio of the number of apples to the number of bananas is $6 : 4$.

The ratio of the number of bananas to the number of apples to the number of kiwi fruit is $4 : 6 : 8$.

The ratio of the number of kiwi fruit to the number of bananas to the number of apples is $8 : 4 : 6$.

- 3 The lengths of two sticks, A and B are represented using a model.



Total length of the two sticks = $3 + 5 = 8$ cm

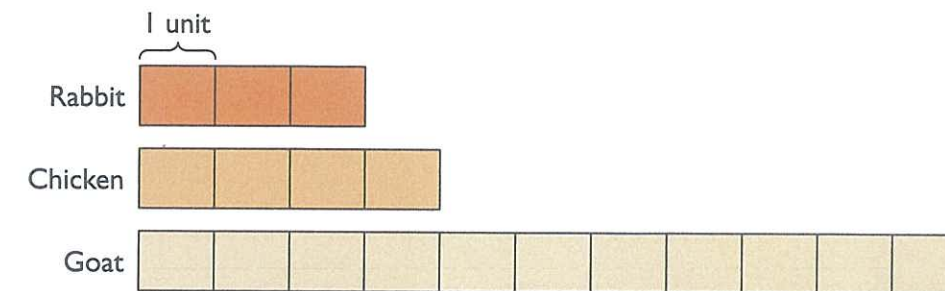
The ratio of the length of Stick A to the total length of the two sticks is $3 : 8$.

So, the length of Stick A is $\frac{3}{8}$ of the total length of the two sticks.

The ratio of the length of Stick A to the length of Stick B is $3 : 5$. So, the length of Stick A is $\frac{3}{5}$ of the length of Stick B.

The ratio of the length of Stick B to the length of Stick A is $5 : 3$. So, the length of Stick B is $\frac{5}{3}$ of the length of Stick A.

- 4 The masses of a rabbit, a chicken and a goat are shown below.



The ratio of the mass of the chicken to the mass of the goat is $4 : 12$.

The mass of the chicken is $\frac{1}{3}$ of the mass of the goat.

The mass of the goat is 3 of the mass of the chicken.

The ratio of the mass of the rabbit to the mass of the goat is $3 : 12$.

The mass of the rabbit is $\frac{1}{4}$ of the mass of the goat.

The mass of the goat is 4 of the mass of the rabbit.

The ratio of the mass of the rabbit to the total mass of the three animals is $3 : 19$.

The mass of the rabbit is $\frac{3}{19}$ of the total mass of the three animals.



- 5 The ratio of Sam's height to Gopi's height is 5 : 2.
- The ratio of Sam's height to the total height of the two boys is : .
 - Gopi's height is $\frac{\text{ }}{\text{ }}$ of Sam's height.
 - Sam's height is $\frac{\text{ }}{\text{ }}$ of Gopi's height.

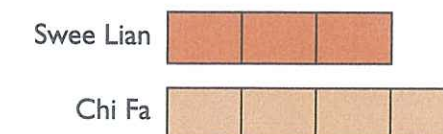
- 6 The number of adults and children watching a show is represented by a model.



- The ratio of the number of adults to the number of children is 4 : 12 = 1 : 3.
- The ratio of the number of children to the number of adults is : .
- The number of adults is $\frac{1}{3}$ of the number of children.
- The number of children is $\frac{3}{1}$ of the number of adults.
So, the number of children is 3 times as many as the number of adults.

- 7 Fairuz spent \$21 and Brad spent \$42.
- The ratio of the amount of money Fairuz spent to the amount of money Brad spent is : .
 - The amount of money Fairuz spent is $\frac{\text{ }}{\text{ }}$ of the amount of money Brad spent.
 - The amount of money Brad spent is times the amount of money Fairuz spent.

- 8 Swee Lian saved $\frac{3}{4}$ as much money as Chi Fa.



- The ratio of Swee Lian's savings to Chi Fa's savings is 3 : 4.
- The ratio of Chi Fa's savings to their total savings is 4 : 7.
- Chi Fa's savings was $\frac{4}{7}$ of their total savings.

- 9 Ramesh cut a rope into two pieces. The length of the first piece was $\frac{4}{7}$ of the length of the second piece.



- The ratio of the length of the first piece to that of the second piece was : .
- The ratio of the length of the second piece to the total length was : .
- The length of the second piece was $\frac{\text{ }}{\text{ }}$ of the total length.





In the following table, you are given the ratio of a quantity to another quantity. Complete the table.

Ratio statement	Fraction statement
$A : B = 3 : 8$	A is $\frac{\quad}{\quad}$ of B.
$C : D = 4 : 7$	C is $\frac{\quad}{\quad}$ of D.
$E : F = 5 : 9$	E is $\frac{\quad}{\quad}$ of F.

Compare the first quantity of each ratio statement with the numerator of the fraction statement. Then compare the second quantity of each ratio statement with the denominator of the fraction statement.

What do you notice after comparing? Do you observe a pattern? Write a statement about the pattern that you have observed.



Maths Journal

Work in pairs.

Write three fraction statements for each of the following.

- a The ratio of the number of chicken eggs to the number of duck eggs is $4 : 7$.

Example:

The number of chicken eggs is $\frac{4}{7}$ of the number of duck eggs.

- b Fang saved \$450 per month while Lily saved \$150 per month.

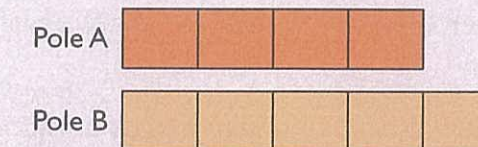


- 1 X represents 2 units of stamps and Y represents 7 units of stamps.



- a Find the ratio of X to Y.
 b X is $\frac{\quad}{\quad}$ of Y.
 c Y is $\frac{\quad}{\quad}$ of X.

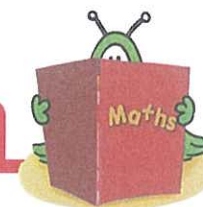
- 2 The ratio of the length of Pole A to the length of Pole B is $4 : 5$.



- a Find the ratio of the length of Pole A to the total length of the two poles.
 b What fraction of the length of Pole A is the length of Pole B?
 c What fraction of the length of Pole B is the length of Pole A?
 d What fraction of the total length of the two poles is the length of Pole A?
 e What fraction of the total length of the two poles is the length of Pole B?

- 3 Govan's mass is $\frac{3}{5}$ of Tiffany's mass.

- a What is the ratio of Tiffany's mass to Govan's mass?
 b What is the ratio of Govan's mass to their total mass?
 c Express Govan's mass as a fraction of their total mass.
 d What fraction of the total mass is Tiffany's mass?

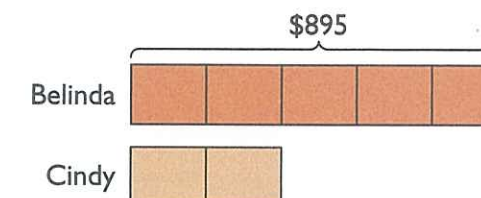


- 4 Jessie had \$15 and Katrina had \$21.
- Find the total amount of money they had altogether.
 - Find the ratio of the amount of money Jessie had to the amount of money that Katrina had.
 - Express the amount of money Jessie had as a fraction of the amount of money that Katrina had.
 - Express the amount of money Katrina had as a fraction of the amount of money that Jessie had.
 - Find the ratio of the amount of money Jessie had to the total amount of money that they had altogether.
 - Express the amount of money Jessie had as a fraction of the total amount of money that they had altogether.
- 5 Three children, Ali, Boon Keng and Kannan, shared some beads in the ratio 2 : 3 : 4.
- Express the number of beads Ali had as a fraction of the total number of beads.
 - Express the number of beads Kannan had as a fraction of the number of beads Boon Keng had.
 - What fraction of the total number of beads Ali and Kannan had is the number of beads Boon Keng had?
 - How many times the number of beads Ali had is the number of beads Kannan had?
- 6 Steven bought a piece of meat and cut it into three pieces. The mass of the first piece of meat was $\frac{5}{8}$ of the mass of the second piece of meat. The mass of the second piece of meat was $\frac{4}{7}$ of the mass of the third piece of meat.
- Find the ratio of the mass of the first piece of meat to that of the second piece of meat to that of the third piece of meat.
 - What is the ratio of the mass of the second piece of meat to the total mass of the 3 pieces of meat?
 - What fraction of the total mass of the 3 pieces of meat was the mass of the third piece of meat?

WB 6A, p 95
Practice 1

Word Problems (I)

- 1 Belinda's salary is $\frac{5}{2}$ of Cindy's salary. Belinda earns \$895.
- Find the ratio of Belinda's salary to Cindy's salary.
 - How much do they earn altogether?



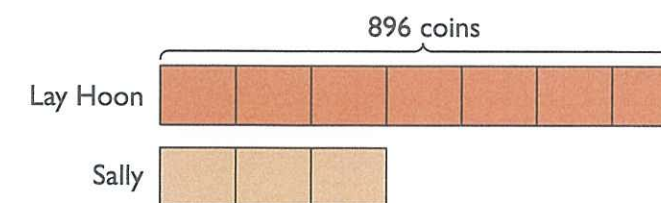
$$\text{Total number of units} = 5 + 2 = 7$$

From the model, we see that:

- The ratio of Belinda's salary to Cindy's salary is 5 : 2.
- 5 units \rightarrow \$895
1 unit \rightarrow $\$895 \div 5 = \179
7 units \rightarrow $\$179 \times 7 = \1253

They earn \$1253 altogether.

- 2 The number of coins Lay Hoon has is $\frac{7}{3}$ of the number of coins Sally has. Lay Hoon has 896 coins.
- Find the ratio of the number of coins Sally has to the number of coins Lay Hoon has to the total number of coins they have.
 - How many coins do they have altogether?



$$\text{Total number of units} = \text{ } + \text{ } = \text{ } \text{ units}$$

From the model, we see that:

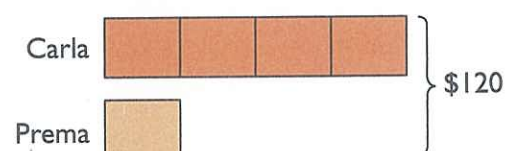
- a The ratio of the number of coins Sally has to the number of coins Lay Hoon has to the total number of coins they have is $\square : \square : \square$.

- b 7 units \rightarrow \square coins
 1 unit \rightarrow $\square \div \square = \square$ coins.
 \square units \rightarrow $\square \times \square = \square$ coins.

They have \square coins altogether.

- 3 Carla's savings is 4 times as much as Prema's savings. Both girls save a total of \$120.

- a What is the ratio of Carla's savings to Prema's savings to their total savings?
 b What fraction of their total savings is Carla's savings?
 c What fraction of Carla's savings is Prema's savings?
 d How much does Carla save?



- a Total number of units = 5
 The ratio of Carla's savings to Prema's savings to their total savings is 4 : 1 : 5.
 b The ratio of Carla's savings to their total savings is 4 : 5.
 Carla's savings is $\frac{4}{5}$ of the total savings.
 c The ratio of Prema's savings to Carla's savings is 1 : 4.
 Prema's savings is $\frac{1}{4}$ of Carla's savings.

- d From the model, we see that:


$$\begin{aligned} 5 \text{ units} &\rightarrow \$120 \\ 1 \text{ unit} &\rightarrow \$\frac{120}{5} = \$24 \\ 4 \text{ units} &\rightarrow 4 \times \$24 = \$96 \end{aligned}$$

Carla saves \$96.

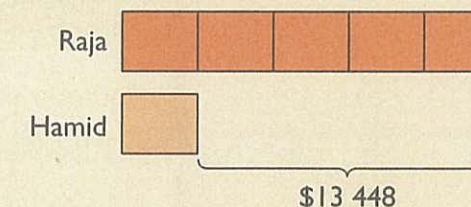
The ratio of Carla's savings to their total savings is 4 : 5.
 Carla's savings is $\frac{4}{5}$ of their total savings.

$$\begin{aligned} \text{So, Carla's savings} &= \frac{4}{5} \times \$120 \\ &= \$96 \end{aligned}$$



- 4  Raja spent 5 times as much money as Hamid. Raja spent \$13 448 more than Hamid.

- a What is the ratio of the amount of money Raja spent to the amount of money Hamid spent to the total amount of money spent?
 b What fraction of the total amount of money spent is the amount of money Raja spent?
 c How much did each person spend?



From the model, we see that:


- a The ratio of the amount of money Raja spent to the amount of money Hamid spent to the total amount of money spent is $\square : \square : \square$.

b $\frac{\text{Amount Raja spent}}{\text{Total amount spent}} = \frac{\square}{\square}$

The amount of money Raja spent is $\frac{\square}{\square}$ of the total amount of money spent.

- c \square units \rightarrow \$ \square
 \square unit \rightarrow \$ \square
 \square units \rightarrow \$ \square

Raja spent \$ \square and Hamid spent \$ \square .

- 5  The ratio of the number of stamps Mary has to the number of stamps Lee Ping has is 3 : 2. The ratio of the number of stamps Lee Ping has to the number of stamps Dewi has is 4 : 5. Mary, Lee Ping and Dewi have 75 stamps altogether.

- a Find the ratio of the number of stamps Mary has to the number of stamps Dewi has.
b How many stamps does Dewi have?

a

Mary's stamps : Lee Ping's stamps $\times 2 \quad \left(\begin{smallmatrix} 3 : 2 \\ 6 : 4 \end{smallmatrix} \right) \times 2$	Lee Ping's stamps : Dewi's stamps 4 : 5
--	--

Make Lee Ping's ratio units the same for both.



The ratio of the number of stamps Mary has to the number of stamps Dewi has is 6 : 5.

b **Method 1**

$$\text{Total number of units} = 6 + 4 + 5 = 15$$

$$15 \text{ units} \rightarrow 75 \text{ stamps}$$

$$1 \text{ unit} \rightarrow \frac{75}{15} = 5 \text{ stamps}$$

$$5 \text{ units} \rightarrow 5 \times 5 = 25 \text{ stamps}$$

Dewi has 25 stamps.

Method 2

The ratio of the number of stamps Dewi has to the total number of stamps is 5 : 15 = 1 : 3.

$$\begin{aligned} \text{Dewi's stamps} &= \frac{1}{3} \times 75 \\ &= 25 \end{aligned}$$

Dewi has 25 stamps.

- 6 Ani, Betty and Jaya keep fish as pets. The ratio of the number of fish Ani has to the number of fish Betty has is 2 : 1. The ratio of the number of fish Betty has to the number of fish Jaya has is 2 : 3.

- a Find the ratio of the number of fish Ani has to the number of fish Betty has to the number of fish Jaya has.
b If they have a total of 27 fish, how many fish do Ani and Betty have altogether?

a

Ani's fish : Betty's fish $\times \quad \left(\begin{smallmatrix} 2 : 1 \\ 4 : 2 \end{smallmatrix} \right) \times$	Betty's fish : Jaya's fish 2 : 3
--	-------------------------------------

The ratio of the number of fish Ani has to the number of fish Betty has to the number of fish Jaya has is $\square : \square : \square$.

b **Method 1**

$$\text{Total number of units} = \square$$

$$\square \text{ units} \rightarrow \square \text{ fish}$$

$$\square \text{ unit} \rightarrow \square = \square \text{ fish}$$

$$\square \text{ units} \rightarrow \square \times \square = \square \text{ fish}$$

Ani and Betty have \square fish altogether.

Method 2

$$\text{Ani's fish : Total number of fish} = \square : \square$$

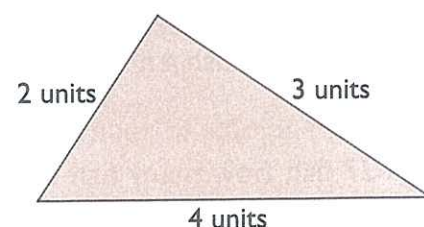
$$\begin{aligned} \text{Ani's fish} &= \square \times \square \\ &= \square \end{aligned}$$

$$\text{Betty's fish : Total number of fish} = \square : \square$$

$$\begin{aligned} \text{Betty's fish} &= \square \times \square \\ &= \square \end{aligned}$$

Ani and Betty have \square fish altogether.

- 7 The sides of a triangle are in the ratio 2 : 3 : 4. The sum of all the sides of the triangle is 162 cm. Find the length of the longest side of the triangle.




Sum of the three sides = 9 units

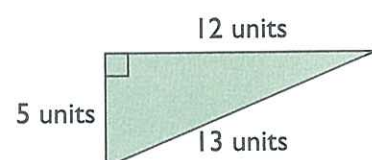
9 units \rightarrow 162 cm

1 unit \rightarrow $162 \div 9 = 18$ cm

4 units \rightarrow $4 \times 18 = 72$ cm

The length of the longest side of the triangle is 72 cm.

- 8  The sides of a right-angled triangle are in the ratio 5 : 12 : 13. The sum of the shortest side and the longest side is 144 cm. Find the length of the third side of the triangle.



Sum of the shortest side and the longest side = $5 + 13$
= units

18 units \rightarrow cm

1 unit \rightarrow $\frac{1}{18} =$ cm

12 units \rightarrow $12 \times$ = cm

The length of the third side of the triangle is cm.



- 1 Mala's mass was $\frac{3}{2}$ of Liling's mass. Their total mass was 90 kg.
- Find the ratio of Mala's mass to Liling's mass.
 - What fraction of the total mass of the two girls was Liling's mass?
 - What fraction of the total mass of the two girls was Mala's mass?
 - Find the mass of each girl.
- 2 The mass of potatoes used by Mrs Wee in her cooking was $\frac{5}{2}$ of the mass of carrots used. She used 9 kg more potatoes than carrots.
- Find the ratio of the mass of potatoes used to the mass of carrots used to the total mass of both ingredients.
 - What fraction of the total mass of both ingredients was the mass of the potatoes?
 - Find the total mass of both ingredients.
- 3 A wall has an area of 7.2 m^2 . It was painted yellow and brown. The area of the wall painted yellow was 3 times as large as the area painted brown.
- What was the ratio of the area painted yellow to the area painted brown?
 - What was the ratio of the area painted yellow to the area of the entire wall?
 - What fraction of the area of the entire wall was painted brown?
 - Find the area of the wall painted yellow.





Comparing Ratios

- I** Mrs Chen made five mixtures of apple and guava juice using different amounts of juice. She recorded them in a table.

Mixture	A	B	C	D	E
Amount of apple juice (ml)	300	450	600	750	900
Amount of guava juice (ml)	200	300	400	500	600

Find the ratio of the amount of apple juice to the amount of guava juice in each mixture.



Mixture	A	B	C	D	E
Amount of apple juice : Amount of guava juice	3 : 2	3 : 2	3 : 2	3 : 2	3 : 2

What can you say about the ratios?

We say that the ratio of the amount of apple juice used to the amount of guava juice used is the **same** in each mixture.

We can also say that the amount of apple juice used and the amount of guava juice used are in a **fixed ratio**.



- 4** Peter and Sam won some money in a competition. Peter won 5 times as much money as Sam. Sam won \$4200 less than Peter.
- What was the ratio of the amount of money Peter won to the amount of money Sam won to the total amount of money both boys won?
 - What fraction of the total amount of money both boys won did Peter win?
 - What fraction of the total amount of money both boys won did Sam win?
 - How much money did each person win?
- 5** The ratio of the number of pupils in Class A to the number of pupils in Class B is 2 : 5. The ratio of the number of pupils in Class B to the number of pupils in Class C is 10 : 3.
- Find the ratio of the number of pupils in Class A to the number of pupils in Class B to the number of pupils in Class C.
 - If there are 70 pupils in Class A and Class C altogether, how many pupils are there in Class B?
 - If Class B has 40 pupils, how many pupils are there in Class A and Class C altogether?
- 6**  The ratio of the length of a rectangle to its breadth is 9 : 4. If the perimeter of the rectangle is 104 cm, find the area of the rectangle.
- 7**  The ratio of the length of a parallelogram to that of its breadth is 7 : 4. The length is longer than the breadth by 746.1 cm. Find the perimeter of the parallelogram.

WB 6A, p 103
Practice 2

- 2 Mr Ahmad uses the following table to prepare four different mixtures of cement and sand. Complete the table.

Number of pails of cement	4	8	12	16
Number of pails of sand	3	6	9	12
Number of pails of cement : Number of pails of sand	4 : 3	8 : 6	<input type="text"/> : <input type="text"/>	<input type="text"/> : <input type="text"/>
Number of pails of cement : Number of pails of sand (Simplest form)	4 : 3	4 : 3	<input type="text"/> : <input type="text"/>	<input type="text"/> : <input type="text"/>
Number of pails of cement Number of pails of sand	$\frac{4}{3}$	$\frac{4}{3}$	<input type="text"/>	<input type="text"/>

$$\begin{array}{c} 4 : 3 \\ \times 2 \\ \hline 8 : 6 \end{array}$$



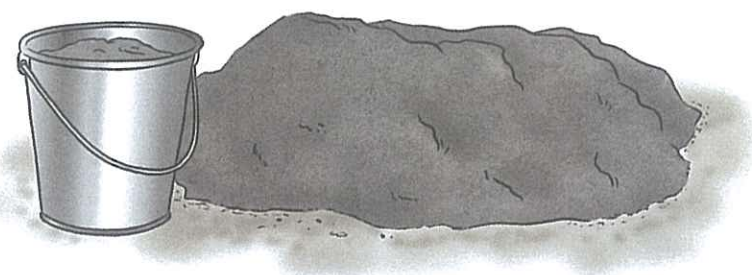
What can you say about the ratios in the fourth row of the table?

Are all the ratios the same? ☐

What can you say about the fractions in the fifth row of the table?

Are all the fractions the same? ☐

So the number of pails of cement used and the numbers of pails of sand used are in a fixed ratio.



- 3 To make some dough, Suzy mixes 5 cups of flour with every 3 cups of water.

- a Find the ratio of the amount of flour used to the amount of water used.
- b If Suzy wants to make 5 times the amount of dough as above, how many cups of water and how many cups of flour does she need?
- c If she uses 21 cups of water, how many cups of flour are needed to make the same type of dough?
- a The ratio of the amount of flour used to the amount of water used is 5 : 3.

b

$$\frac{\text{Number of cups of flour}}{\text{Number of cups of water}} = \frac{5}{3} = \frac{25}{15}$$

$\times 5$

$$\begin{array}{l} 5 \times 5 = 25 \\ 3 \times 5 = 15 \end{array}$$



Suzy needs 15 cups of water and 25 cups of flour.

c **Method 1**

$$\frac{\text{Number of cups of flour}}{\text{Number of cups of water}} = \frac{5}{3} = \frac{35}{21}$$

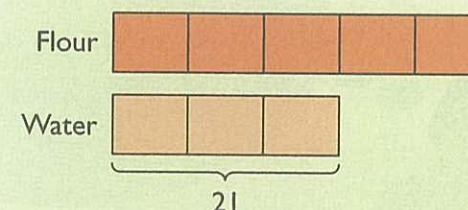
$\times 7$

$$\begin{array}{l} 3 \times 7 = 21 \\ 5 \times 7 = 35 \end{array}$$



35 cups of flour are needed.

Method 2



3 units \rightarrow 21 cups

1 unit $\rightarrow 21 \div 3 = 7$ cups

5 units $\rightarrow 5 \times 7 = 35$ cups

35 cups of flour are needed.

- 4 Mrs Lam prepares oat porridge for her children. For each bowl of oat porridge, she always uses 3 cups of water for every 2 cups of oats.

- a Find the ratio of the number of cups of water used to the number of cups of oats used.
- b If she wants to prepare 5 bowls of oat porridge, how many cups of water and how many cups of oats does she need?
- c If she uses 18 cups of oats, how many cups of water does she need?

- a The ratio of the number of cups of water used to the number of cups of oats used is $\frac{3}{2}$: $\frac{15}{10}$.

b $\frac{\text{Number of cups of water used}}{\text{Number of cups of oats used}} = \frac{3}{2} = \frac{15}{10}$

Mrs Lam needs 15 cups of water and 10 cups of oats.

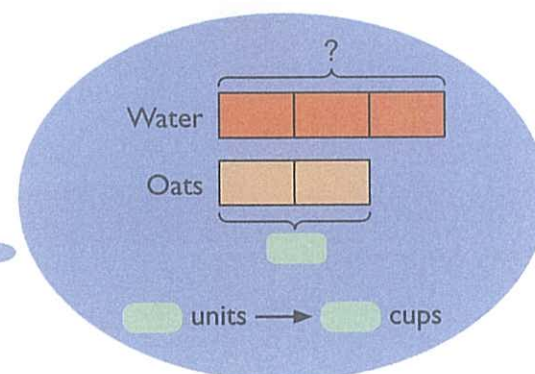
$$\frac{3}{2} = \frac{15}{10}$$

$\times 5$



c $\frac{\text{Number of cups of water used}}{\text{Number of cups of oats used}} = \frac{3}{2} = \frac{18}{12}$

Mrs Lam needs 18 cups of water.

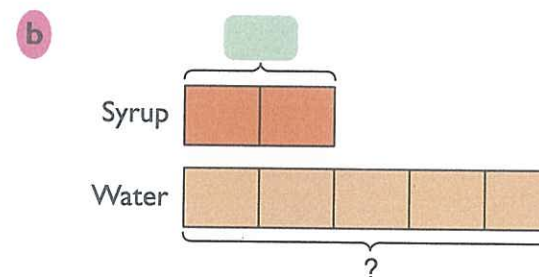


- 5 Dewi mixed 200 ml of syrup with every 500 ml of water to make a drink for a party.

- a Complete the table if the ratio of the amount of syrup to the amount of water is the same.

Amount of syrup (ml)	200	600	1000		1800
Amount of water (ml)	500	1500		3500	
Amount of syrup : Amount of water					

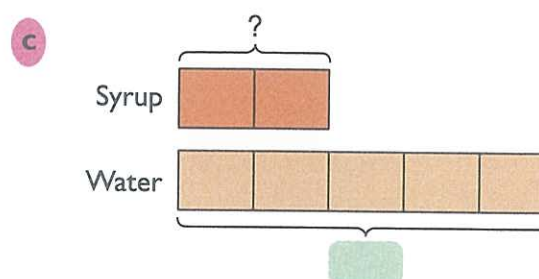
- b Based on the table in a, how much water is needed if 800 ml of syrup is used?
- c Based on the table in a, how much syrup is needed if 400 ml of water is used?



2 units \rightarrow ml

5 units \rightarrow ml

ml of water are needed.



5 units \rightarrow ml

2 units \rightarrow ml

ml of syrup are needed.



Carry out this activity.

Work in groups of four.

a Your teacher will provide each group with some green and red beans.

i Form different groups of beans such that the ratio of the number of green beans to the number of red beans in each group is 3 : 2. Record your results in a table.

Example:

Group	A	B	C	D
Number of green beans	3			
Number of red beans	2			

ii If there are 72 red beans in a group, how many green beans are there?

b Your teacher will provide each group with a cup, a spoon, 4 empty jars, a jug of water and a bottle of food colouring.

i In a jar, mix 1 spoonful of food colouring with 3 cups of water.

ii Prepare 3 more jars of the same type of mixture as in **i** using different amounts of food colouring and water. Record the amounts of water and food colouring used in a table.

iii If 75 cups of water are used, how many spoonfuls of food colouring are needed?

Home Maths

Get your child to help you make konnyaku jelly by mixing konnyaku jelly powder, sugar and water. Show your child the recipe and ask him/her to find the ratio of the amount of konnyaku jelly powder to that of sugar. Ask your child to find the amount of sugar needed to make twice the amount of konnyaku jelly.

To make 24 jellies

Ingredients: 10 g konnyaku jelly powder
210 g sugar
950 ml water

Recipe: 1) Mix the konnyaku jelly powder and sugar together. Mix well.
2) Pour the mixture of konnyaku jelly powder and sugar into water gradually and stir till boiling.
3) Turn off the flame and continue stirring for 5 minutes, until the bubbles dissipate and the konnyaku jelly solution turns clear.
4) Pour the solution into moulds and chill to set.




- 1** Mrs Tan uses 90 g of flour for every 20 g of sugar to make a donut.
 - a** Find the ratio of the mass of flour to the mass of sugar used.
 - b** To make the same type of donut, how many grams of sugar does Mrs Tan need if she uses 270 g of flour?
 - c** If she made 5 donuts of the same type, how many grams of flour and how many grams of sugar did she use?
- 2** Julie uses 3 teaspoons of sugar for every 8 oranges to make orange juice.
 - a** Find the ratio of the number of oranges used to the number of teaspoons of sugar used.
 - b** To make the same type of orange juice, how many teaspoons of sugar does Julia need if she uses 24 oranges?
 - c** To make the same type of orange juice, how many oranges does Julia use if she uses 24 teaspoons of sugar?
- 3** In a science experiment, Fatimah mixed water and vinegar in the ratio 3 : 1.
 - a** If she used 745.2 ml of water, how many millilitres of vinegar did she use?
 - b** If 0.28 ℓ of vinegar was used, how many litres of water did Fatimah use?



- 4 Mr Lim mixes blue paint and yellow paint to make green paint. When 4 pails of blue paint and 5 pails of yellow paint are mixed, a container of green paint is obtained.

- Find the ratio of the number of pails of yellow paint used to the number of pails of blue paint used.
- If Mr Lim uses a total of 63 pails of blue and yellow paint, how many pails of blue paint does he use?
- How many containers of green paint can Mr Lim get if he uses 12 pails of blue paint and 15 pails of yellow paint?
- How many pails of yellow paint does Mr Lim use if he makes 5 containers of green paint?

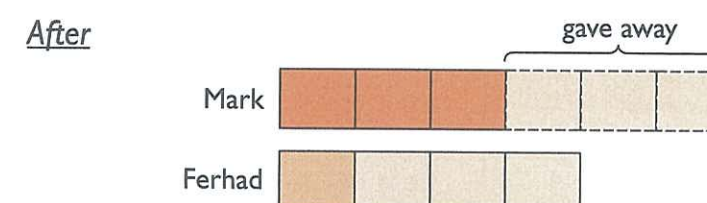
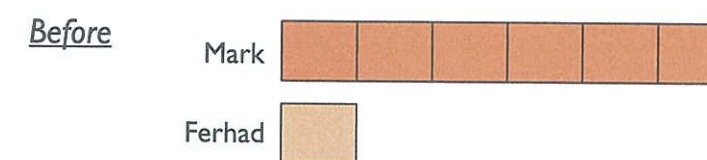
- 5  Mrs Muthu used 125 g of butter, 200 g of chocolate chips and 125 g of caster sugar to make a bag of candy. Mrs Muthu make 75 bags of candy to sell at a charity sale. Find the:

- ratio of the mass of butter used to that of chocolate chips used to that of caster sugar used.
- mass of caster sugar used, in kilograms.
- total mass of butter, chocolate chips and caster sugar used, in kilograms.

WB 6A, p 109
Practice 3

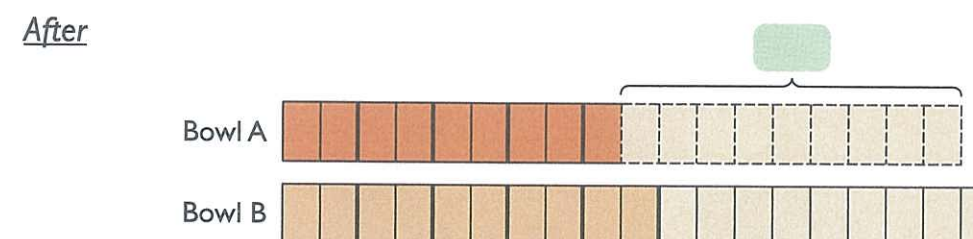
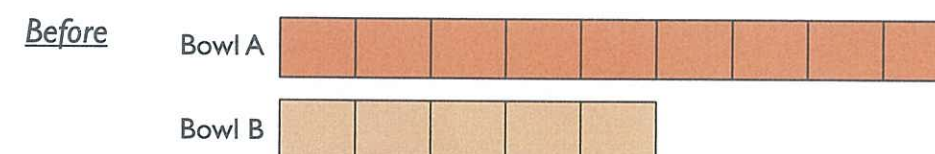
Word Problems (2)

- 1 Mark and Ferhad had some money in the ratio 6 : 1. Mark gave half of his money to Ferhad. Find the ratio of the amount of money Mark had left to the amount of money Ferhad had in the end.



The ratio of the amount of money Mark had left to the amount of money Ferhad had in the end is 3 : 4.

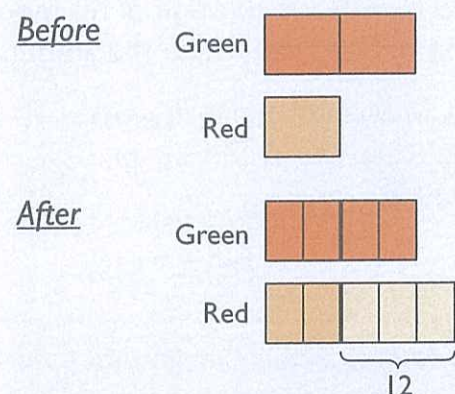
- 2 Mrs Lim pours some cereal into two bowls. The ratio of the mass of cereal in Bowl A to the mass of cereal in Bowl B is 9 : 5. She transfers half of the cereal from Bowl A to Bowl B. What is the new ratio of the mass of cereal in Bowl A to the mass of cereal in Bowl B?



The new ratio of the mass of cereal in Bowl A to the mass of cereal in Bowl B is  : .

- 3 Chitra puts some green and red unit cubes in a box. The ratio of the number of green cubes to the number of red cubes is 2 : 1. She adds 12 more red cubes in the box and the ratio becomes 4 : 5.

- a How many green cubes are there in the box?
b How many red cubes does Chitra have in the end?



There is no change in the number of green cubes.



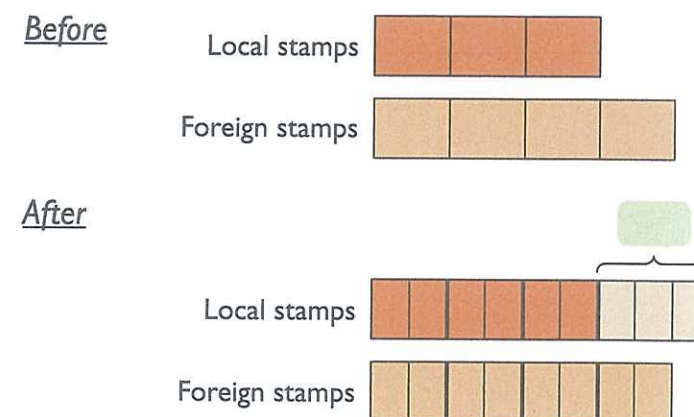
From the model, we see that:

- a 3 units \rightarrow 12 cubes
1 unit $\rightarrow \frac{12}{3} = 4$ cubes
4 units $\rightarrow 4 \times 4 = 16$ cubes
There are 16 green cubes in the box.
- b 5 units $\rightarrow 5 \times 4 = 20$ cubes
Chitra has 20 red cubes in the end.



- 4 Salina had some local and foreign stamps. The ratio of the number of local stamps to the number of foreign stamps was 3 : 4. She bought 21 more local stamps and the ratio became 9 : 8.








- a How many foreign stamps did Salina have?
b How many local stamps did Salina have in the end?



There is no change in the number of foreign stamps.

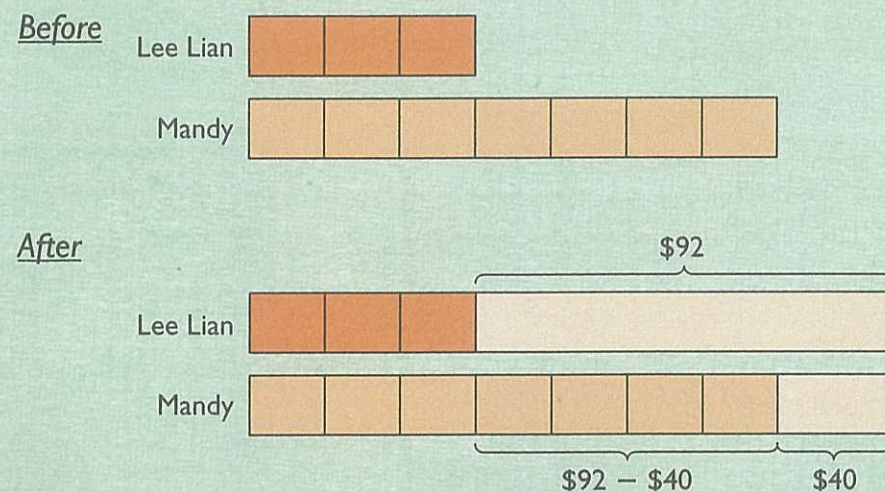


From the model, we see that:

- a 3 units \rightarrow  stamps
 units \rightarrow  stamps
Salina had  foreign stamps.
- b  units \rightarrow  stamps
Salina had  local stamps in the end.



- 5 Lee Lian and Mandy had some money in the ratio 3 : 7. After Lee Lian received \$92 and Mandy received \$40, both girls had an equal amount of money. How much money did each girl have at first?



From the model, we see that:

$$4 \text{ units} \rightarrow \$92 - \$40 \\ = \$52$$

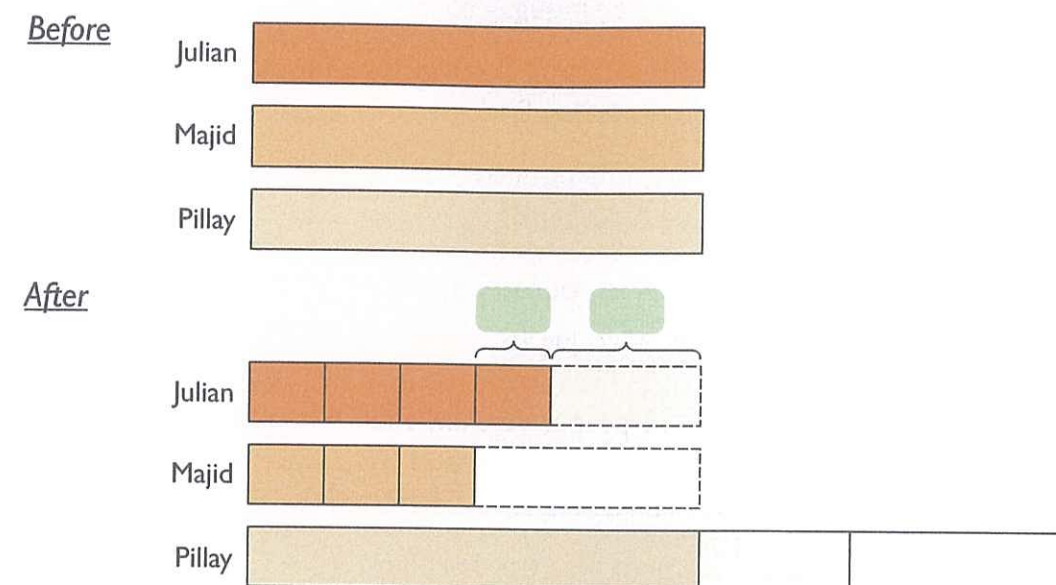
$$1 \text{ unit} \rightarrow \$\frac{52}{4} \\ = \$13$$

$$3 \text{ units} \rightarrow 3 \times \$13 \\ = \$39$$

$$7 \text{ units} \rightarrow 7 \times \$13 \\ = \$91$$

Lee Lian had \$39 and Mandy had \$91 at first.

- 6 Julian, Majid and Pillay had the same number of rubber bands. During a game, Julian lost 12 rubber bands to Pillay and Majid lost 20 rubber bands to Pillay. The ratio of Julian's rubber bands to Majid's rubber bands became 4 : 3. How many rubber bands did each boy have at first?



From the model, we see that:

$$1 \text{ unit} \rightarrow \text{green block} \text{ rubber bands}$$

$$4 \text{ units} \rightarrow 4 \times \text{green block} \\ = \text{green block} \text{ rubber bands}$$

In the end, Julian had green block rubber bands.

$$\text{green block} + \text{green block} = \text{green block}$$

Each boy had green block rubber bands at first.

Let's Practise! 5d



- 1 The ratio of the volume of water in Jug A to the volume of water in Jug B is 2 : 5.
 - a If half of the water in Jug A is poured into Jug B, what is the new ratio of the volumes of water in Jug A to Jug B?
 - b If half of the water in Jug B is poured into Jug A, what is the new ratio of the volumes of water in Jug A to Jug B?
 - c If $\frac{1}{3}$ of the water in Jug A is poured into Jug B, what is the new ratio of the volumes of water in Jug A to Jug B?
- 2 Sam used cement and sand to prepare a mixture. The ratio of the number of pails of cement used to the number of pails of sand used was 1 : 2. Sam then added 8 more pails of cement and the ratio became 5 : 2.
 - a How many pails of cement was used at first?
 - b How many pails of sand was used?
- 3 The ratio of the amount of money Karen had to the amount of money Peter had was 2 : 5. After Peter received \$75 from his mother, the ratio became 4 : 15. How much money did each person have at first?
- 4 The ratio of the number of coins Azam had to the number of coins Eddie had was 3 : 7. Eddie gave 42 coins to Azam and they ended up having the same number of coins. How many coins did each person have at first?
- 5 Tina and Gopal had some stickers in the ratio 2 : 3. Gopal gave half of his stickers away and the ratio became 4 : 3. If Gopal had given away 21 stickers, how many stickers did each person have at first?
- 6 There were 3 glasses containing the same volume of liquid. Mr Lee poured 210 ml of the liquid from Glass A into Glass C, and 150 ml of the liquid from Glass B into Glass C. In the end, the ratio of the volume of liquid in Glass A to the volume of liquid in Glass B was 3 : 8.
 - a What was the final volume of liquid in Glass A?
 - b What was the volume of liquid in each glass at first?

WB 6A, p 113
Practice 4

Let's Explore!



The ratio of the number of beads collected by Meera to the number of beads collected by Normah is 9 : 4. Meera gave some beads to Normah.

- a Find all the possible ratios of the number of beads Meera had to the number of beads Normah had, so that Meera will still have more beads than Normah after she gave Normah some beads.
- b Is it possible for both Meera and Normah to have the same number of beads after Meera gave Normah some beads? Explain why.

Let's Wrap It Up!



You have learnt to:

- express one value as a fraction of another given their ratio, and vice versa
- find how many times one value is as large as another given their ratio, and vice versa
- solve word problems which involve:
 - (a) finding one part when the ratio and the whole are given
 - (b) finding one part or the whole when the ratio and the difference is given
 - (c) two pairs of ratios
 - (d) ratios in real-life situations
- use unitary method and models to solve word problems in ratio

Let's revise!

- 1 Find the ratio of red beads to yellow beads.



The ratio of red beads to yellow beads is 3 : 5.

- 2 The ratio of Siti's age to Tracy's age is 4 : 7. Express Siti's age as a fraction of Tracy's age.

Siti's age is $\frac{4}{7}$ of Tracy's age.

- 3 Jeya's height is $\frac{5}{2}$ of Weiming's height. Find the ratio of Jeya's height to Weiming's height.

The ratio of Jeya's height to Weiming's height is 5 : 2.

- 4 The mass of a bag of rice is 3 times the mass of a bag of fruits. If the mass of the bag of rice is 15 kg, find the mass of the bag of fruits.

The mass of the bag of fruits is 5 kg.

- 5 Sumin had 3 times as much money as Katrina. Sumin and Katrina had \$96 altogether.

- a Find the ratio of Sumin's money to Katrina's money.

The ratio of Sumin's money to that of Katrina's money was 3 : 1.

- b What fraction of the total amount of money was Sumin's money?

Total amount of money = $3 + 1 = 4$ units

Sumin's money was $\frac{3}{4}$ of the total amount of money.

- c How much money did each person have?

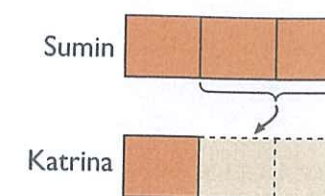
4 units \rightarrow \$96

1 unit \rightarrow $\$96 \div 4$
= \$24

3 units \rightarrow $\$24 \times 3$
= \$72

Sumin had \$72 and Katrina had \$24.

- d How much money must Sumin give to Katrina so that Katrina will have 3 times as much money as Sumin?



$$2 \text{ units} \rightarrow \$24 \times 2 \\ = \$48$$

Sumin must give Katrina \$48 so that Katrina will have 3 times as much money as Sumin.



Put On Your Thinking Caps!

Mrs Kim had a total of 33 watches and necklaces in her shop. After selling some watches and necklaces, she had 12 of them left. The ratio of the number of watches sold to the number of watches left was 1 : 2. The ratio of the number of necklaces sold to the number of necklaces that were left was 3 : 1. How many necklaces were there at first? Complete the table below to solve the problem.

(Hint: Make a list and solve the problem using guess and check.)

Number of watches sold (W1)	Number of watches left (W2)	W1 : W2 (1 : 2)	Number of necklaces sold (N1)	Number of necklaces left (N2)	N1 : N2 (3 : 1)	Total number of watches and necklaces left	Total number of watches and necklaces at first
1	2	1 : 2	30	10	3 : 1	12	$1 + 2 + 30 + 10 = 43$

WB 6A, p 119
Challenging Practice

WB 6A, p 120
Problem Solving

Review E

1 Write the numbers in words.

a 328 950

b 1 500 002

c 7 930 000

2 Find the value of each of the following. Where necessary, give your answer correct to 2 decimal places.

a $64.9 + 18.275$

b $1.9 - 0.695$

c 30.75×12

d $15.97 \div 65$

3 a $7 \div \frac{1}{4}$ is .

b What is the value of $\frac{2}{3} \div \frac{4}{9}$?

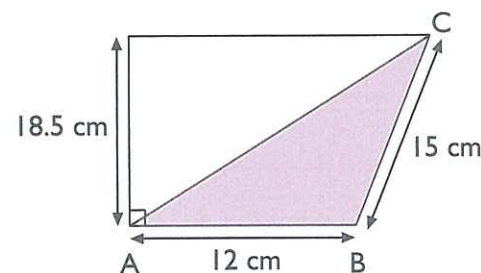
c How many one-fifths are there in $\frac{9}{10}$?

4 Arrange the following in increasing order: $\frac{3}{4}, \frac{7}{9}, \frac{2}{3}$.

5 Faridah had $2\frac{1}{2}$ kg of sugar. She used $\frac{1}{8}$ kg for making cookies and $1\frac{3}{4}$ kg for making cakes. She used $\frac{1}{2}$ of the remainder for making syrup. How much sugar had Faridah left?

6 Which of the following could be the height of a teacher's table?
1.5 m, 0.75 m, 15 cm, 5m

7 What is the area of triangle ABC?

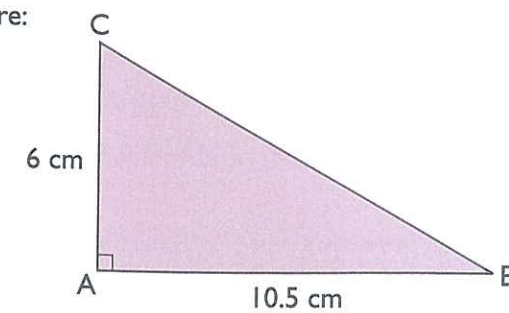


8 Find the product of 1253 and 999. In the answer that you have found, how many of the digits are odd?

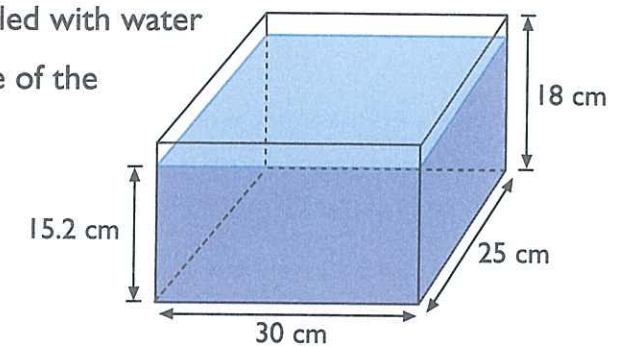
9 The side of a cube is 15 cm. Find its volume.

10 Draw a right-angled triangle ABC where the height is 6 cm and the base is 10.5 cm. Then measure the length of BC.

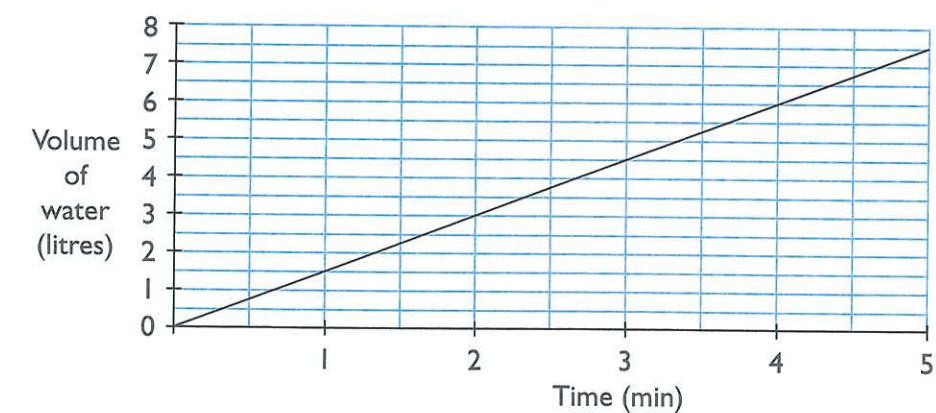
Sketch of figure:



11 A tank 30 cm by 25 cm by 18 cm is filled with water to a height of 15.2 cm. What is the volume of the water? Give your answer in litres.



12 The graph below shows the volume of water in a tank at different times. What is the volume of water in the tank at 3 minutes?



13 Express the following percentages as fractions in their simplest forms.

a 40%

b 25%

c 93%

d 78%

- 14 Express the following decimals as percentages.

- a 0.4 b 0.75
c 0.845 d 1.0

- 15 Steven had \$700. He spent 89% of it. How much money had he left?


- 16 Geetha and Harit had \$800 in the ratio of 1 : 3. Their parents gave each of them \$40. How much did Geetha have in the end?

- 17 Find the average of 76 cm, 43.4 cm and $14\frac{2}{5}$ cm.

- 18 The figure below shows the marks that Chuan Lim scored for 3 subjects. If the average mark scored was 83, what was the highest possible mark that Chuan Lim could have scored for Mathematics?

Subject	Marks
English	75
Mathematics	8
Science	9

- 19 Madam Hayati takes 6 minutes to mark 5 worksheets. How long will she take to complete marking 38 such worksheets? Give your answer in minutes and seconds.

- 20  The charges for developing and printing photographs at a shop are given below.

Developing	\$1.50 per roll
Printing	35¢ per photograph

Othman sent 2 rolls of film for developing and printing. If he paid \$24, how many photographs were there?

- 21 Simplify the following expressions.

- a $a + 2a - a$ b $9f + 6 - 3f + 4$

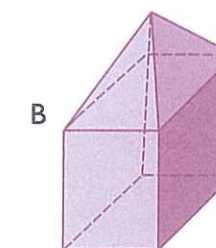
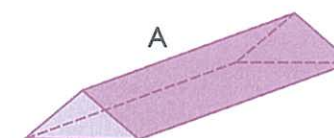
- 22 Find the value of each expression if $m = 9$.

- a $\frac{4m-5}{3}$ b $2m + 6$ c $25 + \frac{m}{3}$

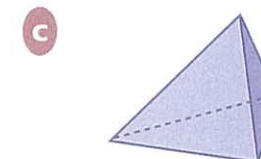
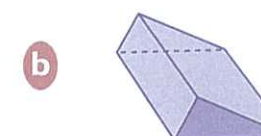
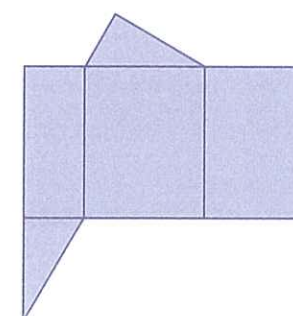
- 23 Soo Ling bought 7 similar files. She gave the cashier \$50 and received \$y as change. What was the cost of each file? Give your answer in terms of y.

- 24 In the figures shown below, A is a prism and B is a solid made up of a pyramid and a cuboid. For each figure, find the number of:

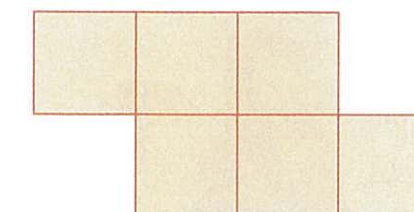
- a faces b rectangular faces c triangular faces



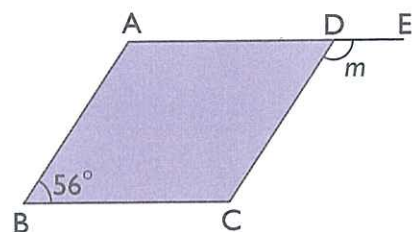
- 25 Which of the following solids is formed by the net shown below?



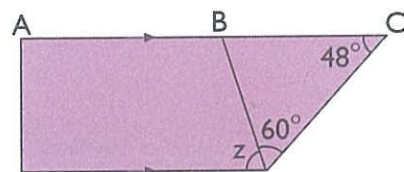
- 26 Look at the figure shown below. Will it form a cube?



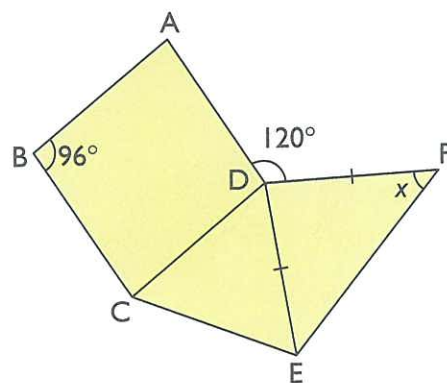
- 27 In the figure below, which is not drawn to scale, ABCD is a parallelogram. ADE is a straight line. Find $\angle m$.



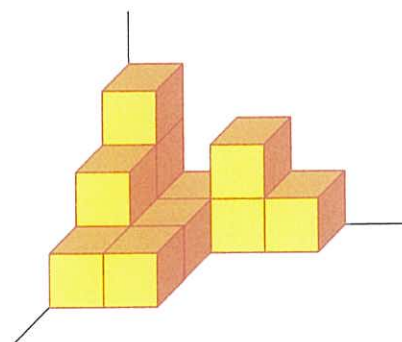
- 28 The trapezium below is not drawn to scale. ABC is a straight line. Find $\angle z$.





- 29 The figure on the right is not drawn to scale. It shows a rhombus ABCD, an isosceles triangle DEF and an equilateral triangle CED. Find $\angle x$.

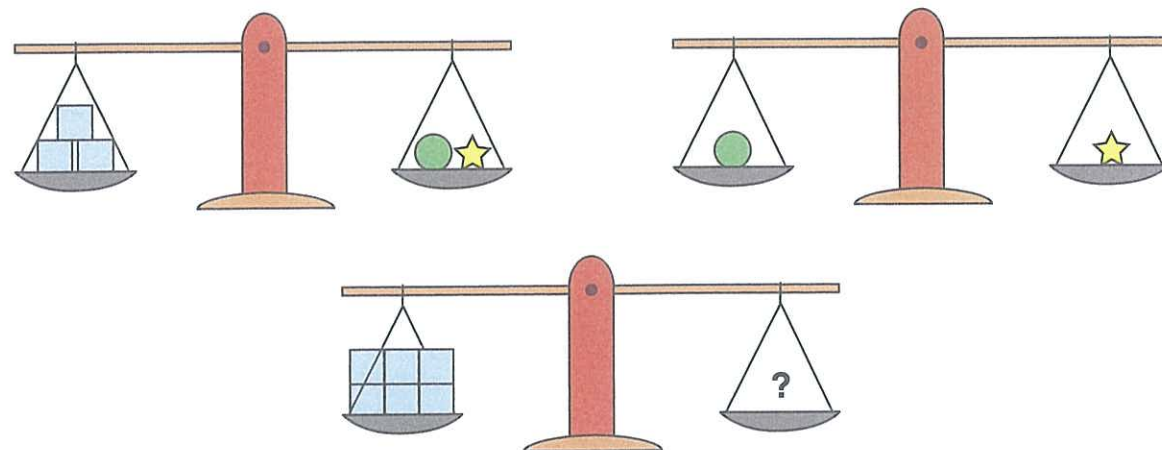


- 30 Some cubes are stacked at a corner of a room. How many cubes are needed to make the solid shown in the figure below?

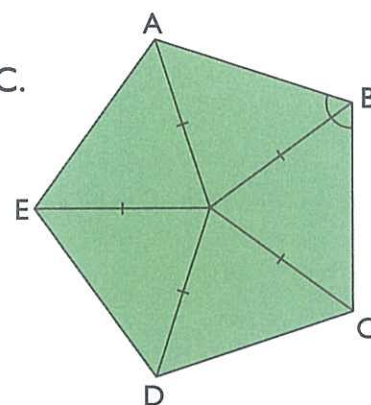


- 31 The ratio of Arun's savings to Majid's savings is 5 : 3. Express Arun's savings as a fraction of Majid's savings.
- 32 At a car park, the number of cars is $\frac{4}{5}$ of the number of vans. What is the ratio of the number of vans to the number of cars?
- 33 The number of sweets John ate is $\frac{2}{3}$ of the number of sweets Peter ate. What is the ratio of the number of sweets John ate to the total number of sweets they ate?
- 34 The ratio of the length of a rope to the length of a stick is 3 : 1. How many times the length of the stick is the length of the rope?
- 35  5 apples cost \$1.85. Find the cost of 15 apples.
- 36 Mrs Raju used rice and chicken to cook porridge. The ratio of the mass of rice used to the mass of chicken used was 2 : 5. If Mrs Raju had used a total of 350 g of rice and chicken, how much more chicken than rice did she use?
- 37  Sam, Taufik and Rita shared 96 marbles in the ratio 8 : 5 : 3. If each boy gave Rita 8 marbles, what would be the new ratio of the number of marbles Sam had to the number of marbles Taufik had to the number of marbles Rita had?
- 38 The ratio of the number of mangoes to the number of apples at a fruit stall is 3 : 4. The ratio of the number of pears to the number of apples is 5 : 2. What fraction of the total number of fruits is the number of pears?
- 39 There are some cars and motorcycles at a car park. There are 3 more motorcycles than cars. If there are 54 wheels altogether,
- how many motorcycles are there?
 - how many cars are there?
- 40 Linus had some 20-cent and 50-cent coins. The number of 20-cent coins was $\frac{3}{7}$ the number of 50-cent coins. He saved another 20 coins of each type. Then the number of 20-cent coins became $\frac{7}{11}$ of the number of 50-cent coins. How many 20-cent coins were there at first?

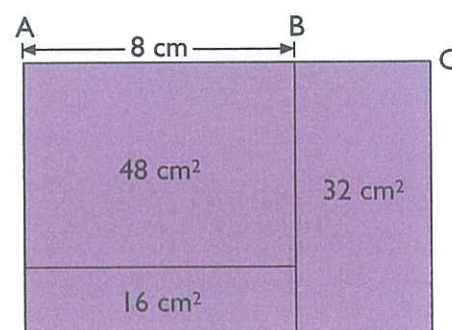
- 41 Look at the figures below. How many ★ are needed to balance the 6 cubes?



- *42 The figure shown is not drawn to scale. It is made up of 5 identical isosceles triangles. Find $\angle ABC$.



- *43 The figure is made up of three rectangles. The area of each rectangle is given. Given that $AB = 8$ cm, find the length of BC .



- *44 Kenneth earned \$1560 in January, which was \$270 less than what he earned in February. He spent \$165 more in February than in January.
- In January, he spent twice as much as he saved. How much did he spend in February?
 - How much did he save in the two months?

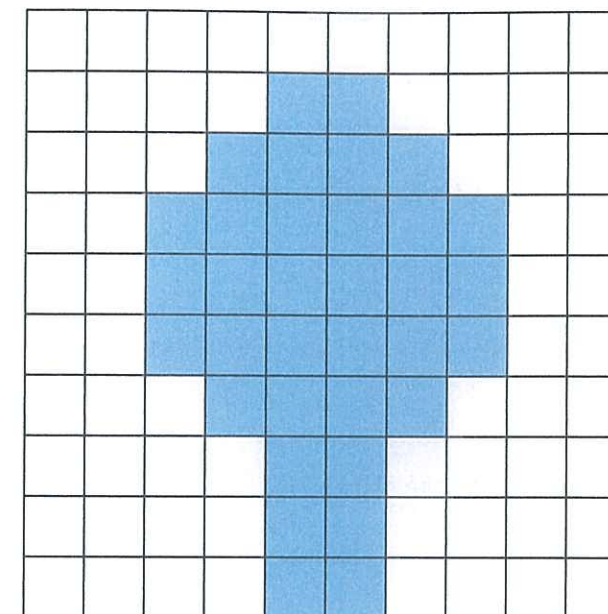
6 Percentage

Let's Learn!



Finding Percentages

- I Let's recall.



The big square is divided into 100 equal parts.

34 parts are shaded.

The shaded parts can be expressed in the following ways:

As a fraction	As a decimal	As a percentage
$\frac{34}{100}$	0.34	34%

- a Express each fraction as a percentage.

i $\frac{13}{20} = \frac{\quad}{100}$
= $\quad\%$

ii $\frac{19}{25} = \frac{\quad}{100}$
= $\quad\%$

Convert the denominator to 100.

